PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
H0498.70272		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2007/013700	11/06/2007	12/06/2006
Applicant		
PRESIDENT AND FELLOWS OF HARVARD COLLEGE		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☒ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☒ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant
   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 2a
      ☒ as suggested by the applicant
      ☐ as selected by this Authority, because the applicant failed to suggest a figure
      ☐ as selected by this Authority, because this figure better characterizes the invention
   b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/013700

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:

   a. type of material

   [X] a sequence listing

   [ ] table(s) related to the sequence listing

   b. format of material

   [X] on paper

   [X] in electronic form

   c. time of filing/furnishing

   [X] contained in the international application as filed

   [X] filed together with the international application in electronic form

   [ ] furnished subsequently to this Authority for the purpose of search

2. [X] In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/013700

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12Q1/68 H01L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C12Q H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HAHM J ET AL: "Direct Ultrasensitive Electrical Detection of DNA and DNA Sequence Variations Using Nanowire Nanosensors" NANO LETTERS, ACS, WASHINGTON, DC, US, vol. 4, no. 1, 12 September 2003 (2003-09-12), pages 51-54, XP007903534 ISSN: 1530-6984 the whole document -/--	1-29

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 May 2008	29/07/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Aslund, Fredrik

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/013700

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LI Z ET AL: "Sequence-Specific Label-Free DNA Sensors Based on Silicon Nanowires" NANO LETTERS, ACS, WASHINGTON, DC, US, vol. 4, no. 2, 8 January 2004 (2004-01-08), pages 245-247, XP002407747 ISSN: 1530-6984 the whole document	1-29
A	YI CUI ET AL: "Nanowire nanosensors for highly sensitive and selective detection of biological and chemical species" SCIENCE, WASHINGTON, DC, vol. 293, no. 5533, 17 August 2001 (2001-08-17), pages 1289-1292, XP002264236 ISSN: 0036-8075 page 1291, column 2 - page 1292	
A	JENSEN K K ET AL: "KINETICS FOR HYBRIDIZATION OF PEPTIDE NUCLEIC ACIDS (PNA) WITH DNA AND RNA STUDIED WITH THE BIACORE TECHNIQUE" BIOCHEMISTRY, AMERICAN CHEMICAL SOCIETY. EASTON, PA, US, vol. 36, 1 January 1997 (1997-01-01), pages 5072-5077, XP002062488 ISSN: 0006-2960	
P,A	PATOLSKY FERNANDO ET AL: "Nanowire sensors for medicine and the life sciences." NANOMEDICINE (LONDON, ENGLAND) JUN 2006, vol. 1, no. 1, June 2006 (2006-06), pages 51-65, XP002482033 ISSN: 1748-6963	

2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/013700

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search reportcovers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-29

A method, comprising an act of: determining a binding constant and/or a dissociation rate constant between a nucleic acid or an analyte and a nanoscale wire having immobilized relative thereto a binding partner of the nucleic acid.

---

2. claims: 30-41

A method, comprising acts of: diffusing at least a portion of a metal into a first portion of a nanoscale wire but not into a second portion of the nanoscale wire; and immobilizing a reaction entity to a second portion of the nanoscale wire.

---

3. claims: 42-53, 64-77

An article, comprising: a nanoscale wire comprising a first portion comprising a metal silicide; and a reaction entity immobilized relative to a second portion of the nanoscale wire having a composition different from the first portion. Furthermore, An article, comprising: a nanoscale wire comprising a first portion comprising a metal silicide; and a second portion having a composition different from the first portion, whereing the second portion has a greatest dimension no greater than about 100 nm. Furthermore, An article, comprising: a nanoscale wire comprising a first portion and a second portion, the first portion having a binding partner immobilized relative thereto, the second portion being free of the binding partner.

---

4. claims: 54-63

A method, comprising acts of: providing a bulk metal adjacent a semiconductor wire; and diffusing at least a portion of the bulk metal into at least a portion of the semiconductor wire in a longitudinal direction along the semiconductor wire for a distance of at least about 10 nm.

---

5. claims: 78-80

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A solution, comprising:
an analyte; and a nanoscale wire comprising a first portion and a second portion, the second portion having immobilized relative thereto a binding partner to the analyte and the first portion free of the binding partner, wherein the analyte has a Debye screening length greater than the greatest dimension of the second portion of the nanoscale wire.

---

6. claims: 81-85

A method, comprising acts of: determining a number of mismatches between an analyte nucleic acid and a binding partner. nucleic acid immobilized relative to a binding partner of the nucleic acid.
